CUTTING DEVICE

BACKGROUND OF INVENTION

This application is a continuation-in-part of patent application 09/419,412 filed on October 6, 1999.

1. Field of Invention

This invention is directed generally to a cutting device, and more particularly to a cutting device having a pair of opposed legs pivoting about a head member and connected to a cutting blade. The cutting device of the present invention is particularly useful for cutting plastic restraints, cable ties, and the like.

2. Background of the Invention

Restraining devices such as handcuffs are well-known and have been available for many years. The best known restraining devices are handcuffs consisting of a pair of metal rings which are placed about the wrists of an individual and locked into place. While traditional handcuffs serve the purpose of restraining an individual, they have a number of drawbacks. Conventional handcuffs are heavy, bulky to carry, expensive, require a key and are often inconvenient, particularly in multiple arrest situations such as riots and the like.

Because of these drawbacks, it has become more and more desirable to design handcuffs or restraints which are lightweight, inexpensive and do not require a key. Moreover, it has become desirable to utilize disposable restraints, particularly in multiple arrest situations such as mass arrests of demonstrators and gangs.

Further, there has been a movement toward using disposable restraints due to the increasing concern of the spreading of AIDS, as well as Hepatitis, since restrained individuals who struggle violently often create open wounds which result in blood on the handcuffs. Disposable restraints assure that the handcuffs will not be reused and thereby cannot create a carrier for communicable diseases through contamination due to cuts or abrasions received during the detainment.

One type of disposable restraint is described in U.S. Patent No. 5,669,110. Disposable restraints are made of relatively tough plastic to insure that a detainee cannot break free once restrained. One drawback associated with the use of such disposable restraints is the difficulty in removing the restraints. In the past, the restraints have been removed from a detainee by using a cutting tool such as a scissors, clippers, knife, or other implement having an exposed blade(s). However, the use of implements of this type presents the risk of injury to the detainee. The restraints are often tightly positioned about the wrist. When using a scissors, for example, one leg of the scissors is positioned between the wrist and the restraint and then the cutting action of the scissors is performed. When cutting the restraining device in this manner, there is a risk that the exposed scissor legs may cut the wrist of the detainee. This risk increases when the detainee is struggling. Accordingly, there is a need to provide a device for removing restraints that reduces the risk of injury to the detainee upon removal of the restraints. There is also a need to provide a cutting device that can quickly and efficiently be used to remove the restraints.

Most restraint cutters are simple applications of existing tools. They are not designed for the unique applications faced by public safety personnel. They are often misplaced in a correctional environment. Furthermore, knives, scissors and other open-bladed implements can be turned against an officer.

In addition, when using a scissors or clippers, these devices operate by cutting from one side of a restraint to the other. In practice, these devices can often slip off of the restraint prior to severance, and thus having the effect of sliding the restraint between the legs of the scissors as opposed to severing it. Thus there is a further need to provide a cutting device that reduces this problem of slippage that can often occur when using a traditional scissors or clippers to sever the restraint.

3. Summary of the Invention

The subject invention is specifically directed to a compact, easily carried, and lightweight cutting device having a movable cutting blade and a pair of legs that are pivotally mounted to a head member of the cutting device and that are connected to the cutting blade. The cutting device is equipped with a shield which serves as a safety guard to cover the blade and protect a detainee from inadvertent injury upon removal of the restraints. The shield also serves to provide a cutting surface wherein the restraint is positioned between the cutting surface and the cutting blade. To sever the restraint, the legs of the cutting device are pulled together in a manner similar to actuating a pair of pliers. As the legs come together, the cutting blade moves into engagement with the restraint. The tip of the cutting blade pierces the restraint, and upon further forward movement, the cutting blade cuts through the restraint while entering a slit positioned within the cutting surface. In this manner, the cutting device uses compound

leverage to facilitate severing the restraint. Unlike scissors or clippers, when the tip of the cutting blade engages the restraint, the restraint is pinned in place against the cutting surface of the shield. This eliminates the problem of slippage associated with using scissors or clippers.

The cutting device of the present invention provides a cutting device for severing disposable restraints having a shielded cutting blade located in a restricted area where fingers or other body parts cannot enter. The cutting device severs the restraint by initially piercing the restraint and thus eliminates the problem of slippage associated with using traditional scissors or clippers.

In a preferred embodiment, the cutting device further includes leg extensions having hooks that latch onto the opposing leg such that when the leg extensions are in the retracted position, the legs are locked in their closed position. When the leg extensions are pulled out into the extended position, the cutting device is in its unlocked, operable position, and the legs are freely movable into an unlocked open position.

This provides an added measure of safety that allows the cutting device to remain in a locked condition when not in use, and prevents the cutting device from being turned against an officer. The cutting device may also be provided with a keyring hole on the legs or leg extensions whereby the cutting device may be attached to one's keyring and easily accessible when needed.

In a preferred embodiment, the cutting blade has a triangular end culminating in a centrally located outer cutting tip. The cutting blade is disposed in a corresponding slit in the cutting device and preferably has two parallel sides. Two parallel stainless steel pins are preferably located directly adjacent to both sides of the cutting blade such that both sides of the cutting

blade ride against the pins during movement of the cutting blade. The use of the parallel stainless steel pins prohibits the cutting blade from binding in the cutting blade slit during operation. Thus, they provide for reliable, smooth, and trouble-free operation.

BRIEF DESCRIPTION OF THE DRAWINGS

Further advantages of the present invention will become apparent to those skilled in the art with the benefit of the following detailed description of the preferred embodiments and upon reference to the accompanying drawings in which:

FIGURE 1 is a perspective view of the cutting device of the present invention.

FIGURE 2 is a front view of the cutting device.

FIGURE 3 is a back view of the cutting device.

FIGURE 4 is a side view of the cutting device.

FIGURE 5 is a front view of the cutting device with the first and second leg extensions in the extended position and the legs in the closed position.

FIGURE 6 is a front view of the cutting device with the first and second leg extensions in the extended position and the legs in the open position.

FIGURE 7 is a cross-sectional view taken along line 7-7 of FIGURE 4.

FIGURE 8 is a cross-sectional view taken along line 8-8 of FIGURE 7, and showing the cutting blade, connecting rivet, and guide pins.

FIGURE 9 is a cross-sectional view taken along line 9-9 of FIGURE 2, showing the legs locked in place.

FIGURE 10 is a cross-sectional view taken along line 10-10 of FIGURE 2 showing the latches of the leg extensions locked in place.

FIGURE 11 is a cross-sectional view taken along line 11-11 of FIGURE 2, showing the leg extensions housed within the legs.

FIGURE 12 is a cross-sectional view taken along line 12-12 of FIGURE 2, showing the cutting blade within the head member and shield.

FIGURE 13 is a cross-sectional view taken along line 13-13 of FIGURE 6, showing the cutting blade in a retracted condition within the head member, and showing a phantom view of a restraint within the cutting chamber.

FIGURE 14 is a view of the cutting blade and guide pins.

FIGURE 15 is a view of one of the many other types of cutting blades that could be used in the cutting device.

While the invention is susceptible to various modifications and alternative forms, specific embodiments thereof are shown by way of example in the drawings and will herein be described in detail. It should be specifically understood with respect to the drawings, that the drawings are of a preferred embodiment, and there are many other embodiments and forms in which the present invention may appear. It should also be understood that the drawings and detailed description thereof are not intended to limit the invention to the particular form disclosed, but on the contrary, the invention is to cover all modifications, equivalents and alternatives falling within the spirit and scope of the present invention or within the scope of the appended claims.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

A cutting device 10 made in accordance with the principles of the subject invention is depicted in Figures 1-15. As shown in Figure 1, cutting device 10 preferably includes a first leg 12 and

second leg 14 pivotally mounted to head member 16. First and second legs 12 and 14 are preferably mounted using a circular hub on the leg that intersects and fits within a corresponding circular bore on the head member, or vice versa. Shield 18 is connected to head member 16 and is preferably integral therewith.

Cutting blade 20 is positioned within head member 16 and in Figure 1 extends through cutting chamber 21 to shield 18. Also shown are first leg extension 24 and second leg extension 26 as well as keyring opening 28. As discussed below in describing Figures 12-13, connector 22 extends through a circular opening of the first leg 12 through a slot in head member 16, through cutting blade 20 through a circular opening of the second leg 14 to connect the first leg 12, cutting blade 20, and second leg 14.

In Figures 1-3, the legs 12 and 14 are in a closed, locked position with leg extensions 24 and 26 in a first retracted position. In this closed, locked position, cutting blade 20 is in an extended position and the outer cutting tip 30 is positioned within shield 18. In this closed, locked position, the legs 12 and 14 cannot be opened and keyring opening 28 can be used to easily attach the cutting device to one's person.

The ability to easily and reliably access the cutting device provided by the keyring opening is a benefit of the preferred embodiment, otherwise public safety officials may be required to resort to more dangerous and less efficient cutting implements such as knives or scissors.

In a preferred embodiment the head member 16, shield 18, legs 12 and 14, and leg extensions 24 and 26 are comprised of a durable, lightweight plastic material, and most preferably

comprised of a glass-reinforced nylon material having the trade name Zytel and available from DuPont.

Figure 4 shows cutting device 10 and illustrates how leg extension 24 slidably fits within leg 12. Figure 5 shows cutting device 10 with leg extensions 24 and 26 in a second extended position. Leg extensions 24 and 26 are moved into the second extended position by grasping the keyring opening and pulling the leg extensions in a direction away from the cutting blade. With leg extensions 24 and 26 in the second extended position, the cutting device 10 is in a closed, operable position, where latches 42 and 44 are no longer in locking engagement with legs 12 or 14 and the legs may be pulled apart into an open position. Thus, the cutting device is operably movable from a closed, locked position as shown in Figures 1-3, to a closed, operable position shown in Figure 5. In both the closed, locked position and the closed, operable position, the connector 22 is located at an upper point of slot 40 and cutting blade 20 is in an extended position within shield 18.

Figure 6 shows legs 12 and 14 in an open position. As legs 12 and 14 are moved into the open position, connector 22 and cutting blade 20 move to a lower point of slot 40 and cutting blade 20 is in a retracted position within head member 16. In this open position, cutting chamber 21 is available to receive a restraint into the cutting chamber 21. In this open position of Figure 6, public safety officials can position shield 18 between the wrist of a detainee and the restraint to position the restraint into cutting chamber 21. Shield 18 may include lip 50 to facilitate the insertion of the

shield 18 between the restraint and wrist and to help retain the restraint within the cutting chamber

once it has been inserted. Shield 18 and lip 50 are preferably in close proximity to the top of head member 16. Most preferably the distance between the shield 18 or lip 50 and the top of head member 16 is less than .25 inches. This prevents fingers, folds of skin or other body parts to enter the path of the cutting blade within the cutting chamber and further helps to prevent the risk of injury. Shield 18 should also have a sufficiently narrow width to allow the shield to be placed between the wrist of a detainee and the restraint and the lip 50 is preferably more narrow than the rest of the shield.

Once the restraint is within cutting chamber 21, the restraint may be severed by moving legs 12 and 14 back into the closed, operable position of Figure 5. In moving the legs 12 and 14 together connector 22 moves from a lower point of slot 40 to an upper point of slot 40 and the cutting blade in turn engages the restraint.

In a preferred embodiment, the cutting blade 20 has an outer cutting point 30 that moves into cutting engagement with the restraint. In this manner the cutting blade 20 pins the restraint against a cutting surface 60 of shield 18. As cutting blade 20 moves toward shield 18, the outer cutting point 30 pierces the restraint. As shown in Figure 15, the cutting blade 20 may include angled cutting surfaces 35 and 37. When using such a cutting blade, as the cutting blade moves forward into a slit in shield 18, the angled cutting surfaces 35 and 37 provide a cutting action in opposite directions from the point of piercing to cut the restraint in two directions. The cutting device of the present invention provides for compound leverage as a moment of force is supplied about both hubs where the legs 12 and 14 are pivotally connected to the head member 16 and in turn provide a stronger force to the connector and cutting blade in an axial direction

along the slot 40 of head member 16. The use of compound leverage and a cutting blade that works to cut the restraint in

two directions, serves to provide a relatively easy cutting action. In fact, very little squeezing force inbringing the legs together is required to effectuate the severing of the restraint. Thus, restraints can be quickly and efficiently removed with the cutting device of the present invention.

Figure 15 shows an alternative cutting blade 70 having an angled cutting blade 72. When using a blade of this type, and positioned in the cutting device of Figure 2 with side 76 located near enclosed portion 78 of cutting chamber 21, and side 74 located near the open end of cutting chamber 21, the blade serves to trap the restraint within the cutting chamber 21 and force the restraint against the enclosed portion 78. Using a blade of this type and in this manner eliminates the problem of slippage encountered when using traditional cutting implements such as scissors or knives. It will be appreciated by those of skill in the art that many other types of blades could be used in the cutting device and still gain from the benefits of the present invention.

Figure 7 shows a cross-sectional view along line 7-7 of Figure 4. This view shows guides 80 and 82 upon which leg extensions 22 and 24 are respectively aligned. These guides 80 and 82 provide for a smooth slidable engagement between the legs and the leg extensions. Figure 7 also shows stops 84 and 86 against which leg extensions 24 and 26 abut when in the closed, locked position.

Figure 7 also shows transverse slit 100 with head member 16 and corresponding slit 102 within shield 18. Cutting blade 20 is positioned in the transverse slit 100 within head member 16.

Figures 8 and 14 show pins 120 located on either side of cutting blade 20. Pins 120 serve as a guide for cutting blade 20 as it moves from a closed retracted condition to an extended condition. The use of the pins 120 prevent the cutting blade from binding against the sides of transverse slit 100 during operation and also prevent wear of the walls of the transverse slit 100. Pins 120 are preferably made of metal and most preferably are made of stainless steel. Cutting blade 20 is similarly preferably comprised of a high carbon stainless steel.

Figure 9 shows a cross-sectional view along line 9-9 of Figure 2 and shows legs 12 and 14 in a locked condition as latches 42 and 44 are locking the legs together.

Figure 10 shows a cross-sectional view along line 10-10 of Figure 2 and also shows the latches 42 and 44 in a locked condition.

Figure 11 is a cross-sectional view along line 11-11 of Figure 11 showing leg extensions 24 and 26 slidably engaged with legs 12 and 14.

Figure 12 shows a cross-sectional view along line 12-12 of Figure 2 and

Figure 13 shows a cross-sectional view along line 13-13 of Figure 6. Figure 12 shows the connector 22 comprised of first rivet section 130 and second rivet section 132 wherein the first rivet section 130 includes an extension 134 which extends through a hole in cutting blade 20. In

this manner the connector 22 pins the cutting blade between the first and second rivet sections 130 and 132, and cutting blade 20 is positioned within head member 16. Figure 13 depicts a similar view, except that in Figure 12 the cutting device is in the closed, locked position and in Figure 13 the cutting device is in the open position and able to receive a restraint (shown in phantom lines) within cutting chamber 21. In a preferred embodiment connector 22 is a stainless steel rivet, although the connector could take many forms including a screw, bolt, pin, or other connective device known to those of skill in the art.

While certain features and embodiments of the invention have been described wherein, it will be readily understood that the invention encompasses all modifications and enhancements within the scope and spirit of the present invention.